

1 Claim 1 (previously presented): A multiband data
2 communication apparatus which receives signals by switching a
3 plurality of frequency bands in response to a band switching
4 signal, said multiband data communication apparatus
5 comprising:

6 quadrature demodulating means for converting either a
7 reception signal or a reception intermediate frequency signal
8 into a quadrature reception baseband signal, said quadrature
9 demodulating means including:

10 a pair of first quadrature mixers for converting either
11 the reception signal or the reception intermediate frequency
12 signal into a reception baseband signal;

13 local oscillating means for producing a local oscillation
14 signal; and

15 phase shifting means for inputting said band switching
16 signal and for shifting a phase of said local oscillation
17 signal based upon said band switching signal to thereby supply
18 the phase-shifted local oscillation signal to one or both of
19 said pair of first quadrature mixers.

1 Claim 2 (currently amended): A multiband data
2 communication apparatus which transmits signals by switching a
3 plurality of frequency band in response to a band switching
4 signal, said multiband data communication apparatus
5 comprising:

6 quadrature modulating means for converting a quadrature
7 transmission baseband signal into either a transmission signal
8 or a transmission intermediate frequency signal, said

quadrature modulating means including:

a pair of second quadrature mixers for converting a transmission baseband signal into either the transmission signal or the transmission intermediate frequency signal;

local oscillating means for producing a local oscillation signal; and

phase shifting means for inputting said band switching signal and for shifting a phase of said local oscillation signal based upon said band switching signal to thereby supply the phase-shifted local oscillation signal to one or both of said pair of second quadrature mixers.

Claim 3 (previously presented): A multiband data communication apparatus comprising:

quadrature modulating means for converting a quadrature transmission baseband signal into either a transmission signal or a transmission intermediate frequency signal;

quadrature demodulating means for converting either a reception signal or a reception intermediate frequency signal into a quadrature reception baseband signal; and

local oscillation signal producing means for supplying a local oscillation signal to both said quadrature modulating means and said quadrature demodulating means, for transmitting/receiving by switching a plurality of frequency bands in response to a band switching signal,

wherein said quadrature demodulating means includes a pair of first quadrature mixers for converting either the reception signal or the reception intermediate frequency

17 signal into a reception baseband signal; and wherein
18 said quadrature modulating means includes a pair of
19 second quadrature mixers for converting a transmission
20 baseband signal into either the transmission signal or the
21 transmission intermediate frequency signal; and further
22 wherein
23 said local oscillation signal producing means includes
24 local oscillating means for producing a local oscillation
25 signal, and said apparatus further comprises
26 phase shifting means for shifting a phase of said local
27 oscillation signal based upon said band switching signal to
28 thereby supply the phase-shifted local oscillation signal to
29 one or both of said pair of first quadrature mixers and to one
30 or both of said pair of second quadrature mixers.

1 Claim 4 (previously presented): A multiband data
2 communication apparatus as claimed in claim 3, wherein said
3 phase shifting means supplies a signal obtained by shifting
4 the phase of said local oscillation signal by $\pi/2$ to one of
5 said pair of first quadrature mixers and one of said pair of
6 second quadrature mixers, while said phase shifting means
7 supplies one of said local oscillation signal and a signal
8 obtained by inverting a code of said local oscillation signal
9 to the other of said pair of first quadrature mixers and to
10 the other of said pair of second quadrature mixers in response
11 to said band switching signal.

1 Claim 5 (previously presented): A multiband data
2 communication apparatus as claimed in claim 3, wherein said
3 phase shifting means supplies said local oscillation signal to
4 one of said pair of first quadrature mixers and to one of said
5 pair of second quadrature mixers; while said phase shifting
6 means supplies one of a signal obtained by shifting the phase
7 of said local oscillation signal by $\pi/2$ and a signal obtained
8 by shifting the phase of said local oscillation signal by $\pi/2$
9 and ~~by~~ then inverting said phase-shifted local oscillation
10 signal to the other mixer of said pair of first quadrature
11 mixers and also to the other mixer of said pair of second
12 quadrature mixers in response to said band switching signal.

1 Claim 6 (previously presented): A multiband data
2 communication apparatus as claimed in claim 3, wherein said
3 phase shifting means supplies said local oscillation signal to
4 one of said pair of first quadrature mixers and to one of said
5 pair of second quadrature mixers, while said phase shifting
6 means supplies one of a signal obtained by delaying the phase
7 of said local oscillation signal by $\pi/2$ and a signal obtained
8 by advancing the phase of said local oscillation signal by $\pi/2$
9 to the other of said pair of first quadrature mixers and also
10 to the other of said pair of second quadrature mixers in
11 response to said band switching signal.

1 Claim 7 (previously presented): A multiband data
2 communication apparatus which receives signals by switching a
3 plurality of frequency bands in response to a band switching

4 signal, said multiband data communication apparatus
5 comprising:

6 quadrature demodulating means for converting either a
7 reception signal or a reception intermediate frequency signal
8 into quadrature reception baseband signal, said quadrature
9 demodulating means including:

10 a pair of first quadrature mixers for converting either
11 the reception signal or the reception intermediate frequency
12 signal into a reception baseband signal;

13 storage means for saving thereinto discrete data a
14 frequency pattern component functioning as a base;

15 address generating means for generating an address every
16 preselected clock;

17 phase shift means for adding a predetermined number based
18 upon said band switching signal to said address;

19 first analog converting means for analog-converting data
20 which is read out by addressing said storage means based on
21 the address outputted from said address generating means to
22 thereby supply the analog-converted data to one of said pair
23 of first quadrature mixers; and

24 second analog converting means for analog-converting data
25 which is read out by addressing said storage means based on
26 the output of said phase shift means to thereby supply the
27 analog-converted data to the other of said pair of first
28 quadrature mixers.

1 Claim 8 (previously presented): A multiband data
2 communication apparatus which transmits signals by switching a

3 plurality of frequency band in response to a band switching
4 signal, said multiband data communication apparatus
5 comprising:

6 quadrature modulating means for converting a quadrature
7 transmission baseband signal into either a transmission signal
8 or a transmission intermediate frequency signal, said
9 quadrature modulating means including:

10 a pair of second quadrature mixers for converting a
11 transmission baseband signal into either the transmission
12 signal or the transmission intermediate frequency signal;

13 storage means for saving therein discrete data of a
14 frequency pattern component functioning as a base address
15 generating means for generating an address every preselected
16 clock;

17 phase shift means for adding a predetermined number based
18 upon said band switching signal to said address;

19 first analog converting means for analog-converting data
20 which is read out by addressing said storage means based on
21 the address outputted from said address generating means to
22 thereby supply the analog-converted data to one of said pair
23 of second quadrature mixers; and

24 second analog converting means for analog-converting data
25 which is read out by addressing said storage means based on
26 the output of said phase shift means to thereby supply the
27 analog-converted data to the other of said pair of second
28 quadrature mixers.

1 Claim 9 (previously presented): A multiband data
2 communication apparatus comprising:
3 quadrature modulating means for converting a quadrature
4 transmission baseband signal into either a transmission signal
5 or a transmission intermediate frequency signal;
6 quadrature demodulating means for converting either a
7 reception signal or a reception intermediate frequency signal
8 into a quadrature reception baseband signal; and
9 local signal producing means for supplying a local
10 oscillation signal to both said quadrature modulating means
11 and said quadrature demodulating means, for
12 transmitting/receiving by switching a plurality of frequency
13 bands in response to a band switching signal, wherein
14 said quadrature demodulating means includes a pair of
15 first quadrature mixers for converting either the reception
16 signal or the reception intermediate frequency signal into a
17 reception baseband signal; and further wherein
18 said quadrature modulating means includes a pair of
19 second quadrature mixers for converting a transmission
20 baseband signal into either the transmission signal or the
21 transmission intermediate frequency signal; and still further
22 wherein
23 said local oscillation signal producing means includes
24 storage means for saving thereinto discrete data of a
25 frequency pattern component functioning as a base; address
26 generating means for generating an address every preselected
27 clock; phase shift means for adding a predetermined number
28 based upon said band switching signal to said address; first

29 analog converting means for analog-converting data which is
30 read out by addressing said storage means based on the address
31 outputted from said address generating means to thereby supply
32 the analog-converted data to one of said pair of first
33 quadrature mixers; and second analog converting means for
34 analog-converting data which is read out by addressing said
35 storage means based on the output of said phase shift means to
36 thereby supply the analog-converted data to the other of said
37 pair of first quadrature mixers.

1 Claim 10 (previously presented): A multiband data
2 communication apparatus as claimed in claim 9, wherein either
3 said quadrature modulating means or said local oscillation
4 signal producing means includes clock generating means for
5 generating a clock signal and interval determining means for
6 determining a clock interval used to read out data from said
7 storage means so as to control the address generating
8 operation of said address generating means.

1 Claim 11 (previously presented): A communication method
2 of a multiband data communication apparatus including
3 quadrature demodulating means for converting either a
4 reception signal or a reception intermediate frequency signal
5 into a quadrature reception baseband signal, for receiving by
6 switching a plurality of frequency bands in response to a band
7 switching signal, said communication method comprising the
8 steps of:
9 producing a local oscillation signal;

10 providing said band switching signal to a means for
11 shifting a phase for controlling said means for shifting a
12 phase and

13 using said means for shifting a phase for shifting a
14 phase of said local oscillation signal in response to said
15 band switching signal to thereby supply the phase-shifted
16 local oscillation signal to a first quadrature mixer for
17 converting either the reception signal or the reception
18 intermediate frequency signal into a reception baseband
19 signal.

1 Claim 12 (currently amended): A communication method of a
2 multiband data communication apparatus including quadrature
3 modulating means for converting a quadrature transmission
4 baseband signal into either a transmission signal or a
5 transmission intermediate frequency signal, for transmitting
6 by switching a plurality of frequency band in response to a
7 band switching signal, said communication method comprising
8 the steps of:

9 producing a local oscillation signal;

10 providing said band switching signal to a means for
11 shifting a phase for controlling said means for shifting a
12 phase; and

13 using said means for shifting a phase for shifting a
14 phase of said local oscillation signal in response to said
15 band switching signal to thereby supply the phase-shifted
16 local oscillation signal to a second quadrature mixer for
17 converting a transmission baseband signal into either the

18 transmission signal or the transmission intermediate frequency
19 signal.

1 Claim 13 (previously presented): A communication method
2 of a multiband data communication apparatus including
3 quadrature modulating means for converting a quadrature
4 transmission baseband signal into either a transmission signal
5 or a transmission intermediate frequency signal; and
6 quadrature demodulating means for converting either a
7 reception signal or a reception intermediate frequency signal
8 into a quadrature reception baseband signal wherein said
9 apparatus transmits and receives signals by switching a
10 plurality of frequency bands in response to a band switching
11 signal, said communication method comprising the steps of:

12 producing a local oscillation signal; and
13 shifting a phase of said local oscillation signal in
14 response to the band switching signal to thereby supply the
15 phase-shifted local oscillation signal to one or both of a
16 first quadrature mixer and a second quadrature mixer, said
17 first quadrature mixer converting either the reception signal
18 or the reception intermediate frequency signal into a
19 reception baseband signal, and said second quadrature mixer
20 converting a transmission baseband signal into either the
21 transmission signal or the transmission intermediate frequency
22 signal.

1 Claim 14 (previously presented): A communication method
2 of a multiband data communication apparatus as claimed in

claim 13, wherein said phase shifting step includes:

a first supplying step for supplying a signal which is obtained by shifting the phase of said local oscillation signal by $\pi/2$ to one of said first quadrature mixer and said second quadrature mixer;

an inverting step for inverting a code of said local oscillation signal; and

a second supplying step for supplying one of said local oscillation signal and the output signal of said inverting step to the other of said first quadrature mixer and said second quadrature mixer in response to said band switching signal.

Claim 15 (previously presented): A communication method of a multiband data communication apparatus as claimed in claim 13, wherein said phase shifting step includes:

a first supplying step for supplying said local oscillation signal to one of said first quadrature mixer and said second quadrature mixer;

a phase shifting step for shifting the phase of said local oscillation signal by $\pi/2$;

an inverting step for inverting a code of said output signal of said phase shifting step; and

a second supplying step for supplying one of said output signal of said phase shifting step and the output signal of said inverting step to the other of said first quadrature mixer and said second quadrature mixer in response to said band switching signal.

1 Claim 16 (previously presented): A communication method
2 of a multiband data communication apparatus as claimed in
3 claim 13, wherein said phase shifting step includes:

4 a first supplying step for supplying said local
5 oscillation signal to one of said first quadrature mixer and
6 said second quadrature mixer;

7 a phase delaying step for delaying the phase of said
8 local oscillation signal by $\pi/2$;

9 a phase advancing step for advancing the phase of said
10 local oscillation signal by $\pi/2$; and

11 a second supplying step for supplying one of the output
12 signal of said phase delaying step and the output signal of
13 said phase advancing step to the other of said first
14 quadrature mixer and said second quadrature mixer in response
15 to said band switching signal.

1 Claim 17 (previously presented): A communication method
2 of a multiband data communication apparatus including
3 quadrature demodulating means for converting either a
4 reception signal or a reception intermediate frequency signal
5 into a quadrature reception baseband signal, for receiving by
6 switching a plurality of frequency bands in response to a band
7 switching signal, said communication method comprising:

8 a storing step for saving discrete data of a frequency
9 pattern component functioning as a base;

10 an address generating step for generating an address
11 every preselected clock signal;

12 a phase shifting step for adding a predetermined number
13 based upon said band switching signal to said address;

14 a first analog converting step for analog-converting data
15 which is read out by addressing said storing step based on the
16 address outputted from said address generating step to thereby
17 supply the analog-converted data to one of a pair of first
18 quadrature mixers for converting either the reception signal
19 or the reception intermediate frequency signal into a
20 reception baseband signal; and

21 a second analog converting step for analog-converting
22 data which is read out by addressing said storing step based
23 on the output of said phase shifting step to thereby supply
24 the analog-converted data to the other of said first
25 quadrature mixers.

1 Claim 18 (previously presented): A communication method
2 of a multiband data communication apparatus including
3 quadrature modulating means for converting a quadrature
4 transmission baseband signal into either a transmission signal
5 or a transmission intermediate frequency signal, for
6 transmitting by switching a plurality of frequency band in
7 response to a band switching signal, said communication method
8 comprising:

9 a storing step for saving discrete data of a frequency
10 pattern component functioning as a base;

11 an address generating step for generating an address
12 every preselected clock signal;

13 a phase shifting step for adding a predetermined number

14 based upon said band switching signal to said address;

15 a first analog converting step for analog-converting data
16 which is read out by addressing said storing step based on the
17 address outputted from said address generating step to thereby
18 supply the analog-converted data to one of a pair of second
19 quadrature mixers for converting a transmission baseband
20 signal into either the transmission signal or the transmission
21 intermediate frequency signal; and

22 a second analog converting step for analog-converting
23 data which is read out by addressing said storing step based
24 on the output of said phase shifting step to thereby supply
25 the analog-converted data to the other of said second
26 quadrature mixers.

1 Claim 19 (previously presented): A communication method
2 of a multiband data communication apparatus including
3 quadrature modulating means for converting a quadrature
4 transmission baseband signal into either a transmission signal
5 or a transmission intermediate frequency signal; and
6 quadrature demodulating means for converting either a
7 reception signal or a reception intermediate frequency signal
8 into a quadrature reception baseband signal; and for
9 transmitting/receiving by switching a plurality of frequency
10 bands in response to a band switching signal, said
11 communication method comprising:

12 a storing step for saving discrete data of a frequency
13 pattern component functioning as a base;

14 an address generating step for generating an address

15 every preselected clock signal;
16 a phase shifting step for adding a predetermined number
17 based upon said band switching signal to said address;
18 a first analog converting step for analog-converting data
19 which is read out by addressing said storing step based on the
20 address outputted from said address generating step to thereby
21 supply the analog-converted data to one of a first quadrature
22 mixer and a second quadrature mixer, said first quadrature
23 mixer converting either the reception signal or the reception
24 intermediate frequency signal into a reception baseband
25 signal, and said second quadrature mixer converting a
26 transmission baseband signal into either the transmission
27 signal or the transmission intermediate frequency signal; and
28 a second analog converting step for analog-converting
29 data which is read out by addressing said storing step based
30 on the output of said phase shifting step to thereby supply
31 the analog-converted data to the other of said first
32 quadrature mixer and said second quadrature mixer.

1 Claim 20 (original): A storage medium for storing
2 thereinto a computer readable program used to execute the
3 communication method of the multiband data communication
4 apparatus as recited in claim 11, 12, 13, 14, 15, 16, 17, 18,
5 or 19.

1 Claim 21 (previously presented): A multiband data
2 communication apparatus which receives signals by switching a
3 plurality of frequency bands in response to a band switching

4 signal, said multiband data communication apparatus
5 comprising:

6 quadrature demodulating means for converting either a
7 reception signal or a reception intermediate frequency signal
8 into a quadrature reception baseband signal, said quadrature
9 demodulating means including:

10 a pair of first quadrature mixers for converting either
11 the reception signal or the reception intermediate frequency
12 signal into a reception baseband signal;

13 local oscillating means for producing a local oscillation
14 signal;

15 phase shifting means for shifting a phase of said local
16 oscillation signal for input to one of said pair of first
17 quadrature mixers; and

18 means for optionally changing a phase of said local
19 oscillation signal for input to another of said pair of first
20 quadrature mixers based upon said band switching signal to
21 thereby ensure correct polarities of quadrature components of
22 said reception baseband signal.

1 Claim 22 (previously presented): A multiband data
2 communication apparatus which receives signals by switching a
3 plurality of frequency bands in response to a band switching
4 signal, said multiband data communication apparatus
5 comprising:

6 quadrature demodulating means for converting either a
7 reception signal or a reception intermediate frequency signal
8 into a quadrature reception baseband signal, said quadrature

demodulating means including:

a pair of first quadrature mixers for converting either the reception signal or the reception intermediate frequency signal into a reception baseband signal;

local oscillating means for producing a local oscillation signal; and

phase shifting means for inputting said band switching signal for shifting a phase of said local oscillation signal to ensure consistent polarities of quadrature components of said reception baseband signal irrespective of an operating band of the apparatus.

Claim 23 (previously presented): A multiband data communication apparatus as claimed in claim 1, wherein said phase shifting means supplies a signal obtained by shifting the phase of said local oscillation signal by $\pi/2$ to one of said pair of first quadrature mixers, while said phase shifting means supplies one of said local oscillation signal and a signal obtained by inverting a code of said local oscillation signal to the other of said pair of first quadrature mixers in response to said band switching signal.

Claim 24 (previously presented): A multiband data communication apparatus as claimed in claim 1, wherein said phase shifting means supplies said local oscillation signal to one of said pair of first quadrature mixers while said phase shifting means supplies one of a signal obtained by shifting the phase of said local oscillation signal by $\pi/2$ and a signal

7 obtained by shifting the phase of said local oscillation
8 signal by $\pi/2$ and then inverting said phase-shifted local
9 oscillation signal to the other mixer of said pair of first
10 quadrature mixers in response to said band switching signal.

1 Claim 25 (previously presented): A multiband data
2 communication apparatus as claimed in claim 1, wherein said
3 phase shifting means supplies said local oscillation signal to
4 one of said pair of first quadrature mixers, while said phase
5 shifting means supplies one of a signal obtained by delaying
6 the phase of said local oscillation signal by $\pi/2$ and a signal
7 obtained by advancing the phase of said local oscillation
8 signal by $\pi/2$ to the other of said pair of first quadrature
9 mixers in response to said band switching signal.

1 Claim 26 (previously presented): A multiband data
2 communication apparatus as claimed in claim 2, wherein said
3 phase shifting means supplies a signal obtained by shifting
4 the phase of said local oscillation signal by $\pi/2$ to one of
5 said pair of second quadrature mixers, while said phase
6 shifting means supplies one of said local oscillation signal
7 and a signal obtained by inverting a code of said local
8 oscillation signal to the other of said pair of second
9 quadrature mixers in response to said band switching signal.

1 Claim 27 (previously presented): A multiband data
2 communication apparatus as claimed in claim 2, wherein said
3 phase shifting means supplies said local oscillation signal to

4 one of said pair of second quadrature mixers while said phase
5 shifting means supplies one of a signal obtained by shifting
6 the phase of said local oscillation signal by $\pi/2$ and a signal
7 obtained by shifting the phase of said local oscillation
8 signal by $\pi/2$ and then inverting said phase-shifted local
9 oscillation signal to the other mixer of said pair of second
10 quadrature mixers in response to said band switching signal.

1 Claim 28 (previously presented): A multiband data
2 communication apparatus as claimed in claim 2, wherein said
3 phase shifting means supplies said local oscillation signal to
4 one of said pair of second quadrature mixers, while said phase
5 shifting means supplies one of a signal obtained by delaying
6 the phase of said local oscillation signal by $\pi/2$ and a signal
7 obtained by advancing the phase of said local oscillation
8 signal by $\pi/2$ to the other of said pair of second quadrature
9 mixers in response to said band switching signal.

1 Claim 29 (previously presented): A multiband data
2 communication apparatus as claimed in claim 7, wherein either
3 said quadrature demodulating means includes clock generating
4 means for generating a clock signal and interval determining
5 means for determining a clock interval used to read out data
6 from said storage means so as to control the address
7 generating operation of said address generating means.

1 Claim 30 (previously presented): A multiband data
2 communication apparatus as claimed in claim 8, wherein either

3 said quadrature modulating means includes clock generating
4 means for generating a clock signal and interval determining
5 means for determining a clock interval used to read out data
6 from said storage means so as to control the address
7 generating operation of said address generating means.